REMARKS

Favorable consideration of the present application is respectfully requested.

Claim 11, which depended from canceled Claim 10, has also been canceled.

Claims 1-4 have been amended to further recite that the joined portion has a structure characteristic of the recrystallization of the material of the joined portion by annealing. Basis for this is found at page 15, lines 10-20.

The claimed invention is directed to a sputtering target prepared by the butt joining of metal sheets made of the same material. It is important that sputtering targets have a uniform composition in order to minimize the occurrence of arcing, and in order to provide a uniform sputtering rate. In the conventional technique of welding two metal sheets to provide a large size sputtering target, the structure of the crystal grains at the joined portion has been coarsened compared with the non-molten portion, thereby causing a poor appearance and the aforementioned operational defects.

Friction stir welding (FSW) has been known, for example from Rhodes et al, of record. FSW does not melt the material but instead welds by plastic deformation, which reduces the potential for significant changes in the microstructure and mechanical properties of the materials to be welded. However, FSW presents a particular problem in the welding of a sputtering target. That is, the crystal orientation is changed in the joined portion, due to the plastic flow induced by the FSW, resulting in a trace of stirring appearing on the surface after sputtering.

Therefore, according to the invention the sputtering target is additionally subjected to annealing so that the region that has been subjected to crystal reorientation by the plastic flow of the FSW is recrystallized. The extreme change in the crystal orientation due to FSW is thereby reduced (page 15, lines 10-20).

Claims 1-6 and 11-17 were rejected under 35 U.S.C. § 103 as being obvious over Japanese patent publication JP 11-061393 in view of Rhodes et al. According to the Office Action, JP '393 discloses all of the features of Claims 1-4 other than the average particle diameter of Claim 1, the average distance between adjacent intermetallic compound particles of Claim 2, the average grain diameter of metallic crystals of Claim 3, and the lack of dendritic structure of Claim 4. It was the position of the Office Action that these features are either inherent from the FSW of Rhodes et al, or are explicitly taught or suggested at pages 69 and 73 of the reference.

Nonetheless, neither JP '393 nor Rhodes et al is directed to a sputtering target, nor do they evidence a concern for changed crystal orientation in a sputtering target due to plastic flow resulting from FSW. Accordingly, neither reference teaches that a joined portion produced by the FSW of Rhodes et al has a recrystallized structure characteristic of annealing. That is, since neither reference teaches that changes in the crystal orientation of a sputtering target occur due to FSW, neither reference teaches or suggests a further annealing step to recrystallize the joined portion and minimize the FSW trace that would otherwise exist. Thus neither reference teaches or suggests a structure characteristic of the recrystallization by annealing. Claims 1-4, which now recite that the joined portion has a recrystallized structure characteristic of annealing, are therefore believed to clearly define over any combination of the above references.

The remaining dependent claims are also believed to define over the prior art based upon their dependency from Claims 1-4.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early Notice of Allowability.

Respectfully submitted,

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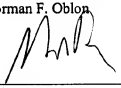

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